

WHAT IS CLAIMED IS:

1. A method of making a semiconductor device including inductors comprising the steps of;

5 forming a semicircle columnar groove in an insulating layer on a semiconductor substrate;

forming underlying conductive lines with a predetermined distance therebetween on said groove;

forming a cylindrical insulating layer in said groove formed with said underlying conductive lines and on the surface of said substrate; and

forming upper conductive lines on said insulator to contact with said underlying conductive lines.

2. A method of making a semiconductor device including inductors as claimed in Claim 1, wherein said step of forming said groove further comprises the steps of:

forming a nitride film on said insulating layer;

forming a photosensitive film pattern for exposing said nitride film for a groove;

etching said nitride film by using said photosensitive film pattern as a mask to be exposed said insulating layer for forming said groove; and

etching said exposed insulating layer.

3. A method of making a semiconductor device including inductors as claimed in Claim 2, wherein said etching step is performed by any one of an isotropic etching method and a mixed method of anisotropic etching and isotropic etching.

4. A method of making a semiconductor device including inductors as claimed in Claim 1, wherein said underlying conductive lines are slantly longitudinally formed along said groove to

across.

5. A method of making a semiconductor device including inductors as claimed in Claim 1, further comprises the steps of:

forming an insulating layer on the surface of said underlying conductive lines;

5 covering the entire surface of said substrate formed with said insulating layer with an oxidization prevention layer; and

burying bury material between said upper conductive lines in said groove.

6. A method of making a semiconductor device including inductors as claimed in Claim 5, wherein said buried material is a flux material, such as spin on glass.

1-0 7. A method of making a semiconductor device including inductors as claimed in Claim 6, wherein said buried material is buried until said oxidization prevention layer is exposed when said flux material is etched back.

8. A method of making a semiconductor device including inductors as claimed in Claim 5, further comprising the step of forming a contact region by etching said insulating layer and said oxidization prevention layer for connecting said underlying and upper conductive lines after the burying step.

9. A method of making a semiconductor device including inductors as claimed in Claim 5, wherein said insulating layer is formed by oxidization of said underlying conductive lines.

10. A method of making a semiconductor device including inductors as claimed in Claim 5, wherein an oxide film is formed on said underlying conductive lines.

11. A method of making a semiconductor device including inductors as claimed in Claim 1, wherein said the step of forming said insulating layer comprises the steps of;

laminating an oxidizable material on the entire surface of said substrate to thereby be entirely buried said groove; and

forming said insulating layer on the surface of said substrate and said groove by oxidation of said oxidizable material.

12. A method of making a semiconductor device including inductors as claimed 11, wherein said step of filling said groove with oxidizable materials further comprises the steps of:

5 laminating oxidizable materials on the entire of said substrate to thereby buried said groove; and

etching said oxidizable materials to fill only in said groove.

13. A method of making a semiconductor device including inductors as claimed 12, wherein said oxidizable materials is any one of polysilicon or amorphous silicon.

10 14. A method of making a semiconductor device including inductors as claimed in Claim 11, wherein said oxidizable material is etched by CMP process.

15 15. A method of making a semiconductor device including inductors as claimed in Claim 11, wherein said step of etching said oxidizable materials is performed by etch-back method.

20 16. A method of making a semiconductor device including inductors as claimed in Claim 1, wherein said upper conductive lines are slantly longitudinally formed with a predetermined distance therebetween to across said groove in the opposite direction of said underlying conductive lines.

25 17. A method of making a semiconductor device including inductors, comprising the steps of:

forming a semicircle groove in an insulating layer on a semiconductor substrate;

forming underlying conductive lines with a predetermined distance therebetween to across groove;

forming a magnetic core in said groove formed with said underlying conductive lines;
and

forming upper conductive lines on said magnetic core, said upper conductive lines being contacted with said underlying conductive lines.

- 5 18. A method of making a semiconductor device including inductors as claimed in Claim 17, wherein said step of forming groove comprises the steps of;

forming an oxide film as a relief region on said substrate;

forming a silicon nitride layer and an oxide film in high temperature on said oxide film;

forming a trench by etching said oxide film, silicon nitride layer and oxide film in high

10 temperature;

forming an oxide film on the entire surface of said substrate;

forming an semicircle groove by wet-etching said oxide film; and

removing said oxide film, silicon nitride layer and oxide film in high temperature.

- 15 19. A method of making a semiconductor device including inductors as claimed in Claim 17, wherein said step of forming underlying conductive lines comprises the steps of;

forming an oxide film on the entire surface of said substrate;

forming a conductive material on said oxide film; and

forming underlying conductive lines with a predetermined distance therebetween along

- 20 said groove by patternizing said conductive material.

20. A method of making a semiconductor device including inductors as claimed in Claim 19, wherein said underlying conductive lines are formed with a predetermined distance therebetween to across said groove.

21. A method of making a semiconductor device including inductors as claimed in Claim 19,

wherein said underlying conductive lines is made of aluminum or copper having low resistance value.

22. A method of making a semiconductor device including inductors as claimed in Claim 17, wherein said step of forming said magnetic core comprises the steps of;

5 forming an oxide film, a magnetic material and a capping oxide layer in order on said substrate formed with said underlying conductive lines;

forming said magnetic core in said groove by patternizing said magnetic material; and

wrapping said magnetic core with said oxide film by forming a spacer at both side of said magnetic core.

10 23. A method of making a semiconductor device including inductors as claimed in Claim 17, wherein said upper conductive lines are slantly longitudinally formed with a predetermined distance therebetween along said groove to across.

15 24. A method of making a semiconductor device including inductors as claimed in Claim 23, wherein said underlying conductive lines are made of aluminum or copper having low resistance value.